

# Macroangiopathic Complications and Associated Factors in Type 2 Diabetics at CNHU-HKM

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## Abstract

Nowadays, chronic clinical manifestations of diabetemellitus constitute an important disease and a huge public health issue. **Aim:** Study the macroangiopathic complications in type 2 diabetics. **Method:** It is a descriptive cross-sectional study with an analytical aim covering the period from January 2019 to December 31, 2021 in the Endocrinology, Metabolism and Nutrition clinic of the National Teaching Hospital Hubert Koutoukou Maga (CNHU-HKM) We thus identified 150 type 2 diabetic patients. **Results:** The prevalence of macroangiopathy was 60% with 11.3% for stroke, 28.6% for acute coronary syndrom, 4% for cervical macroangiopathy, and 46.97% ± 25.36% for obliterating arteriopathy of the lower limbs (OALL). The mean age of the patients was 57.69 ± 1.77 years with a sex ratio 1. The duration of diabetes progression was greater than 10 years for more than half of the patients 52.6%. The main associated cardiovascular risk factors were arterial high blood pressure (64.7%), family history of diabetes (33.7%), obesity with 20.0%. The death rate was 7.3%. **Conclusion:** Macroangiopathy's mortality rate of in type 2 diabetics is high. Prevention remains the best treatment and involves screening for factors associated with macroangiopathy.

## Keywords

Type 2 Diabetes, Macroangiopathy, Coronary Artery Disease, Stroke, Peripheral Arterial Disease

## 1. Introduction

Diabetes is a group of metabolic diseases characterized by chronic hyperglyce-

mia resulting from defective insulin secretion and/or insulin resistance or both [1] [2]. Today it constitutes a major public health issue. According to the International Diabetes Federation (IDF), diabetes is one of the world's ten leading causes of death. It is a costly pathology due to its chronicity and the severity of its complications [3]. Thus, the relative risk of stroke is 2 to 5, coronary insufficiency 2 to 4, and arteritis of lower extremity 5 to 10. Among the complications linked to diabetes, cardiovascular accidents remain the most amazing. They represent the leading cause of death in diabetics. In fact, approximately one in two diabetic patients dies from cardiovascular disease [3] [4]. This falls under diabetic macroangiopathy, the entities of which are silent myocardial ischemia, strokes and arteritis of the lower limbs.

## 2. Method

Our study was carried out in the Endocrinology, Metabolism and Nutrition clinic of the National Teaching Hospital Hubert Koutoukou Maga (CNHU-HKM). It was a descriptive cross-sectional study with analytical aims. It took place over a 3-year period from January 1, 2019 to December 31, 2021. Included in the study are type 2 diabetic patients who were seen (consulted or hospitalized) in our department at the CNHU-HKM in Cotonou during this period and having a complete and usable medical file. Excluded are type 2 diabetic patients with an incomplete or unusable file and pregnant women with diabetes. Screening used was the manual processing of registers and files of every patient that match our inclusion criteria. The dependent variable of our study is the occurrence of macroangiopathic complications (stroke, OALL, silent myocardial ischemia,). The independent variables are sociodemographic, cultural and economic factors (age, sex, ethnicity, profession, socio-economic level, educational level, marital status, factors relating to diabetes: Type of diabetes, duration of diabetes, balance of diabetes: HbA1c, monitoring of diabetes, drug treatment, chronic complications of diabetes, dyslipidemia). An individual survey form developed for this purpose was used for the collection. Data entry was done using Epi info 7.1 software. The data analysis was done using the following software: Epi info 7.1, Epi-data 3.1 and Excel 2016. Verification and clearance were carried out with STATA MP14. Comparison of the frequencies and percentages represented by the qualitative variables was carried out with the Pearson Chi square test or the Fisher exact test if the chi square test condition was not respected; the comparison of the means represented by the variables is made with the Student test. A  $p < 0.05$  was considered statistically significant. In multivariate analysis, the logistic regression model was applied.

## 3. Results

From January 1, 2019 to December 31, 2021, we identified 150 type 2 diabetic patients at CNHU-HKM. Among these patients, 90 had at least one entity of macroangiopathy. Its prevalence was therefore 60%. The average age of the pa-

tients was  $57.69 \pm 1.77$  years. The median age was 58 years and the range were 30 and 90 years. Patients over 60 years old were the most represented. There were as many men as women. The sex ratio was 1: **Table 1**.

Associated factors with diabetes monitoring: **Table 2**.

Diabetes monitoring was irregular for the majority of patients and HbA1c was above 7% in most cases. Glycemic balance was observed in 19 patients among the 125 for whom it was available (*i.e.* 16%). Glycated hemoglobin averaged  $10.48\% \pm 0.72\%$ . The median value was 10.20% and the extremes were 4.8 and 18.90%.

### 3.1. Cardiovascular Risk Factors

A large number of women with abdominal obesity were observed. Ninety-seven patients (or 64.7%) had high blood pressure with 85 (or 87.6%) observing a treatment. Six patients (4%) were tobacco users and averaging 114 packs/year. Thirty-three patients (22%) consumed alcohol and on average 20.09 grams/day.

Within seventy-seven patients (51.7%) having a family background of high blood pressure, 43 of them was first-degree relatives (55.6%).

85 patients had first-degree relatives (69.7%) among the one hundred and twenty-two patients (81.3%) with a family history of diabetes.

### 3.2. Macroangiopathy

Seventeen patients (11.3%) had a stroke, including 16 (94.1%) an ischemic stroke and 1 (5.9%) a hemorrhagic stroke. There was a recurrence for 4 (23.5%).

Silent myocardial ischemia was found in 26 of these patients on the EKG (27.3%).

OALL in its clinical manifestation, intermittent claudication, was found in 13 patients (or 8.7%), including 2 in stage I, 7 in stage II, 2 in stage III and 1 in stage IV.

Distal pulses were present for the majority of patients 72.6%.

Arterial ultrasound of the PAD pelvic limbs was done for 60 patients (*i.e.* 40%). PAD was identified in 45 (75%) and the degree of stenosis was  $46.97\% \pm 25.36\%$  on average.

Associated factors with the occurrence of macroangiopathy in diabetics from the CNHU-HKM of Cotonou: **Table 3**.

There is a statistically significant association between age, the duration more than 15 years and history of high blood pressure in the patient when macroangiopathy occur. On the other hand smoking, alcohol, medical treatment, physical activity and sex are not associated with the occurrence of macroangiopathic complications

### 3.3. Mortality

Total mortality was 7.3%, concerning 11 patients out of the 150 with macroangiopathy. Stroke was the main cause of death.

**Table 1.** Distribution of patients according to age and sex.

	Number	Percentage (%)
Age (years)		
≤40	13	08.7
41 - 50	24	16.0
51 - 60	49	32.7
>60	64	42.6
Sex		
Male	75	50.0
Female	75	50.0

**Table 2.** Distribution of patients according to factors associated with diabetes monitoring.

	Number	Percentage (%)
Discovering delay		
<5	44	29.4
5 - 9	27	18.0
10 - 14	32	21.3
≥15	47	31.3
Followed-up		
Not following	38	25.4
Irregular	74	49.3
Regular	38	25.3
Diabete imbalance		
HbA1C < 7%	19	12.8
HbA1C > 7%	106	71.1
Not done	24	16.1

**Table 3.** Associated factors to macroangiopathy occurrence in diabetics at CNHU-HKM de Cotonou.

	Macroangiopathy		p-value	OR	IC95% [OR]
	Yes	No			
Sex					
Male	50	25	0.09	1	
Female	40	35		1.75	0.9 - 3.38
Age (years)					
≤40	04	09		1	
41 - 50	12	12	0.02	2.25	0.54 - 9.34
51 - 60	32	17		4.23	1.13 - 15.79
>60	42	22		4.29	1.18 - 15.53

**Continued**

History					
<5	23	21		1	
5 - 9	10	17	0.006	0.53	0.2 - 1.43
10 - 14	22	10		2.00	0.7 - 5.21
≥15	35	12		2.66	1.1 - 6.44
Not follow	20	18		1	
Regular	44	30	0.36	1.32	0.6 - 2.9
Irregular	26	12		1.95	0.76 - 4.96
Medical treatment					
None	12	12		1	
Oral anti-diabetics	51	33		1.54	0.62 - 3.84
Insulin	09	06	0.3	1.5	0.4 - 5.54
OAD + Insulin	14	06		2.33	0.67 - 8.11
Tisane	04	02		2	0.3 - 13
Physical activity					
Weekly	08	07		1	
Bi/Tri monthly	13	07	0.7	1.62	0.41 - 6.38
Erractic	68	41		1.45	0.48 - 4.29
High BP background					
No	24	29	0.0006	1	
Yes	66	31		2.57	1.29 - 5.12
Alcohol UI					
No	66	51	0.9	1	
Yes	24	09		2.06	0.8 - 4.81
Tabagism					
No	87	57	0.6	1	
Yes	03	03		0.65	0.12 - 3.36

**4. Discussion**

In our study the prevalence of diabetic macroangiopathy was 60%. Similar figures were found by Sarr *et al.* (57.8%) [5]. On the other hand, prevalences lower than ours were found by Khanouach *et al.* 27.6% [6]. The average age of the patients was  $57.69 \pm 1.77$  years. This average is close to Diagne's *et al.* studies,  $58.72 \pm 11.7$ .

The sex ratio was 1 in our study. However, Diagne *et al.* and Charles *et al.* found respectively 1.11 and 1.36 in favor of women [7] [8].

There is a statistically significant association between age, duration more than 15 years and history of blood pressure within patient enduring macroangiopathy in our study. A similar result was reported in the study by Roux *et al.* where the

patients' diabetes had been evolving for  $15.7 \pm 7.2$  years [9].

Tobacco is one of the most important cardiovascular risk factor; we have identified 4% of smoking patients. Studies by Sow *et al.*, Yameogo *et al.* and Diagne *et al.*, found higher results with respectively 9.1%, 7.2% and 5.7% of diabetics who smoke [7] [10] [11].

Identifying 127 patients out of the 150 with dyslipidemia, (84.7%) confirms UKPDS conclusions that showed the effect of diabetes on plasma lipids thus contributing to excess cardiovascular risk [12]. In addition, a statistically significant link was found between the occurrence of a macroangiopathy entity and dyslipidemia ( $p < 0.05$ ). Our figures are, however, higher than those of Sow *et al.* (31.8%) [10] and Yameogo *et al.* (43.08%) [11].

Silent myocardial infarction was found in 26 patients or 27.4%. This is close to that found by Sarr *et al.*, 24% [5]. Khochtali *et al.*, in diabetics aged over 65 (20%) [13]. In a study on the blood pressure level of diabetics conducted in 2009, Lokrou *et al.* found 14% of diabetics suffering from coronary artery disease [14]. Whereas in 1998 the rate of dyslipidemic diabetics suffering from latent myocardial infarction was 15.1% [15]. Similar proportions were found by Ndiaye *et al.* on one hand (14.2%) [16] and by Khanouach *et al.* on the other hand (13.8%) [6].

Our figures are also higher than those of Koate *et al.* who diagnosed silent myocardial infarction in 9.25% of diabetic patients [17] and those of Sow *et al.* silent myocardial infarction (0.36%) [10]. Diagne *et al.* found 50.02% ischemic heart disease among type 2 diabetic patients [7]. Stroke concerns 11.3% of patients in our series with 94.1% ischemic stroke and 5.9% hemorrhagic stroke.

Limit of study: The type of study (retrospective) is the main limitation because we were limited in the description of certain symptoms that were not always reported in the records.

## 5. Conclusion

The prevalence of macroangiopathy was 60%. Stroke 11.3%, silent myocardial infarction 27.3%, and OALL 46.97%. The mortality rate linked to macroangiopathy is 7.3%, hence the importance of prevention which involves screening for risk factors.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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